WHAT IS CLAIMED IS:

1. A semiconductor device comprising:

an interlayer dielectric film containing Si, C and O; and

an interconnection buried in the interlayer dielectric film,

wherein a concentration of Si or C in a portion of the interlayer dielectric film, the portion being in contact with the interconnection, is higher than that in other portions of the interlayer dielectric film.

2. A method of fabricating a semiconductor device, comprising the steps of:

forming an SiC barrier film over an interconnection;

forming an interlayer dielectric film containing Si, C, and O over the SiC barrier film;

forming a hole reaching the SiC barrier film in the interlayer dielectric film;

performing plasma processing using a hydrogen-containing gas on side surfaces of the interlayer dielectric film, the side surfaces being exposed to the hole;

etching the SiC barrier film to allow the hole to reach the interconnection; and

burying a conductive material in the hole.

3. The method according to claim 2, wherein a gas containing at least H_2 gas is used as the

hydrogen-containing gas.

4. The method according to claim 2, wherein a gas containing at least NH_3 gas is used as the hydrogen-containing gas.

5. The method according to claim 2, wherein the side surfaces of the interlayer dielectric film is modified by the plasma processing, thereby increasing a selectivity to the SiC barrier film .

6. The method according to claim 5, wherein a thickness of the side surfaces to be modified by the plasma processing is not more than 10 nm.

7. The method according to claim 2, wherein the plasma processing is performed by supplying a gas containing N_2 gas and not substantially containing oxygen into a processing chamber in addition to the hydrogen-containing gas.

8. A method of fabricating a semiconductor device, comprising the steps of:

forming an SiC barrier film over an interconnection;

forming an interlayer dielectric film containing Si, C, and O over the SiC barrier film;

forming a hole reaching the SiC barrier film in the interlayer dielectric film;

performing plasma processing on side surfaces of the interlayer dielectric film, the side surfaces being exposed to the hole, thereby forming an organic film on the side surfaces of the interlayer

dielectric film;

etching the SiC barrier film to allow the hole to reach the interconnection; and

burying a conductive material in the hole.

9. The method according to claim 8, wherein the plasma processing is performed by supplying a gas containing carbon and fluorine into a processing chamber.

10. The method according to claim 8, further comprising the step of forming an SiO_2 film on the interlayer dielectric film, between the step of forming the interlayer dielectric film and the step of forming the hole in the interlayer dielectric film,

wherein the hole is also formed in the SiO_2 film in the step of forming the hole in the interlayer dielectric film, and

the plasma processing is performed such that no organic film is formed over the SiO_2 film.

11. The method according to claim 8, wherein C_4F_6 gas is used in the step of performing the plasma processing and in the step of etching the SiC barrier film.

12. A method of fabricating a semiconductor device, comprising the steps of:

forming an SiC barrier film over an interconnection;

forming an interlayer dielectric film containing Si, C, and O over the SiC barrier film;

forming a hole reaching the SiC barrier film in the interlayer dielectric film;

performing plasma processing on side surfaces of the interlayer dielectric film, the side surfaces being exposed to the hole, thereby giving impact to the side surfaces of the interlayer dielectric film to harden the side surfaces;

etching the SiC barrier film to allow the hole to reach the interconnection; and

burying a conductive material in the hole.

13. The method according to claim 12, wherein the plasma processing is performed by supplying a gas containing at least He gas into a processing chamber.

14. The method according to claim 2, wherein a low-dielectric-constant film is formed as the interlayer dielectric film.

15. The method according to claim 8, wherein a low-dielectric-constant film is formed as the interlayer dielectric film.

16. The method according to claim 12, wherein a low-dielectric-constant film is formed as the interlayer dielectric film.

17. The method according to claim 2, wherein a film selected from the group consisting of a porous silica film, SiOC film, porous SiOC film, SiOCN film, and porous SiOCN film is formed as the interlayer dielectric film.

18. The method according to claim 8, wherein a

film selected from the group consisting of a porous silica film, SiOC film, porous SiOC film, SiOCN film, and porous SiOCN film is formed as the interlayer dielectric film.

19. The method according to claim 12, wherein a film selected from the group consisting of a porous silica film, SiOC film, porous SiOC film, SiOCN film, and porous SiOCN film is formed as the interlayer dielectric film.

20. The method according to claim 2, wherein a single damascene method is used, and the hole is formed as a wiring trench.

21. The method according to claim 8, wherein a single damascene method is used, and the hole is formed as a wiring trench.

22. The method according to claim 12, wherein a single damascene method is used, and the hole is formed as a wiring trench.

23. The method according to claim 2, wherein a dual damascene method is used, and the hole is formed as a wiring trench and as a via hole.

24. The method according to claim 8, wherein a dual damascene method is used, and the hole is formed as a wiring trench and as a via hole.

25. The method according to claim 12, wherein a dual damascene method is used, and the hole is formed as a wiring trench and as a via hole.